

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015/2016

TOS1141 – OPERATING SYSTEMS

(All sections / Groups)

31 MAY 2016
09:00 – 11:00 AM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 8 pages with 6 Questions only.
2. Attempt all the sub-questions in **Question 1**.
3. Attempt **FOUR** out of **FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.
4. Please write your answers in the Answer Booklet provided

Question1 MCQ (12 marks)

- (1) Which of the following explanation best described Operating System (OS)?
- (a) The mediator between hardware and software
 - (b) The one program running all the while in a computer system
 - (c) The resource allocator for the computer
 - (d) The control program that monitors accesses to computing resources
 - (e) All of above
- (2) Special purpose systems requiring OS ...
- (a) Does not require a lot of user intervention
 - (b) Have special needs specific to the problems at hand
 - (c) Have design limitations due to hardware
 - (d) Are usually designed with specific time requirement in mind
 - (e) All of above
- (3) Cache is _____.
- (a) A secondary storage
 - (b) Is cheaper than ram
 - (c) A fast temporary storage
 - (d) Limited to one level only
 - (e) None of the above
- (4) Computer hardware refers to
- (a) CPU, memory and system bus
 - (b) CPU, memory and I/O devices
 - (c) CPU and I/O devices
 - (d) Memory and I/O devices
 - (e) None of the above
- (5) A single-user computing system
- (a) must ensure the system is usable by only one user
 - (b) focuses on fair use of the computing resources
 - (c) emphasizes the efficiency of resource use
 - (d) is optimized for ease-of-use for the user
 - (e) None of the above
- (6) Which of the statements about memory below is true?
- (a) Cache is more expensive than ram
 - (b) Secondary storage must reside within the computer chassis
 - (c) Registers are the main construct in the optical storage devices
 - (d) Optical disks are available in large sizes as compared to pen drives
 - (e) None of the above

Continued...

- (7) Interrupt is
- (a) called trap when it is software generated
 - (b) handled by code called the interrupt vector
 - (c) referring to the connection between I/O device and OS
 - (d) generated by the OS as a way to control the user processes
 - (e) None of the above
- (8) Which of the followings are valid directory operations?
- (a) Create a file, delete a file
 - (b) List directory, traverse the file system
 - (c) Debug a directory error, compile directory codes
 - (d) Search a file, rename a file
 - (e) All of the above
- (9) Multiprocessor is good because ...
- (a) it is harder to attack
 - (b) less hardware intensive
 - (c) the total jobs done per unit of time is high
 - (d) easier to design
 - (e) None of the above
- (10) What are the instructions allowed only in the kernel mode?
- (a) User instruction
 - (b) Privileged instruction
 - (c) Instruction to get the current date
 - (d) Non-privilege instruction
 - (e) None of the above
- (11) Computer software refers to
- (a) the word processor
 - (b) the spreadsheet program
 - (c) the audio file player
 - (d) virus protection program
 - (e) All of the above
- (12) Memory is ...
- (a) more expensive when it is available in large number
 - (b) faster when it is cheaper
 - (c) the bottleneck of Network Operating System
 - (d) different for different systems depending on the OS used
 - (e) None of the above

Continued...

Question 2 (12 marks)

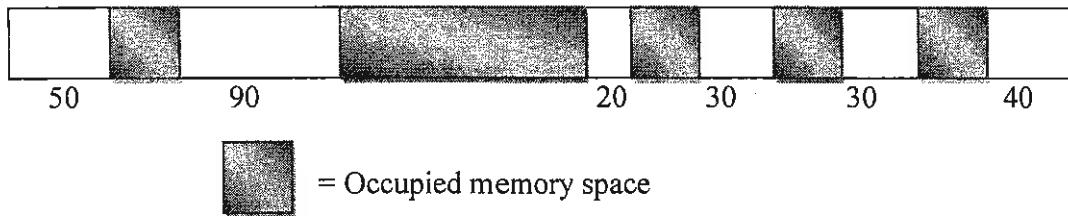
- a) Draw the traditional UNIX operating system structure and briefly mention what is the role of kernel layer in this structure. [4 marks]
- b) Compare time-sharing system and distributed system. Give one benefit of each over the other system. [4 marks]
- c) Define the essential properties of the following types of operating systems: [4 marks]
- i. Batch
 - ii. Interactive
 - iii. Real time
 - iv. Handheld

Continued...

Question 3 (12 marks)

- a) List the three different types of process schedulers and briefly explain them. [3 marks]
- b) Describe the actions taken by a kernel to context switch among threads. List any three benefits of multithreaded system. [4 marks]
- c) Suppose we have a snapshot of the current state of the memory as shown. The number below the diagram represents the available memory size in kilobyte. Sketch the new state of memory for allocation using **first fit**, **best fit** and **worst fit** allocation for the memory request list below:

P1=11kb, P2=13kb, P3=17kb, P4=34kb, P5=55kb



Which of the three approaches is the best in term of least number of holes and which among them causes the most serious fragmentation problem? [5 marks]

Continued...

Question 4 (12 marks)

- a) Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process ID	Burst time (ms)	Arrival time (ms)
1	25	0
2	5	66
3	20	39
4	7	59
5	50	7

Draw the Gantt charts illustrating the execution of these processes using preemptive shortest-job first and first-come first-serve scheduling respectively.

[5 marks]

- b) What is the waiting time of each process for each of the scheduling algorithms?

[4 marks]

- c) List three conditions that their simultaneous occurrence can cause deadlock and explain them briefly.

[3 marks]

Continued...

Question 5 (12 marks)

- a) Consider a system with 5 processes P_0 through P_4 , and 3 resource types: A (10 instances), B (5 instances), and C (7 instances). The following is a snapshot at time T_0 :

	<u>Allocation</u>			<u>Max</u>		
	A	B	C	A	B	C
P_0	0	1	0	7	5	3
P_1	2	0	0	3	2	2
P_2	3	0	2	9	0	2
P_3	2	1	1	2	2	2
P_4	0	0	2	4	3	3

Calculate the Need and Available matrices at time 0. Find the sequence of processes, so that the allocation algorithm can execute safely. [8 marks]

- b) How are pages shared in the virtual memory?

[2 marks]

- c) Explain the difference between internal and external fragmentation

[2 marks]

Continued...

Question 6 (12 marks)

- a) What is a virtual machine? Explain the two techniques used to implement the virtual machine. After that, give an example of virtual machine. [4 marks]
- b) Some systems automatically delete all user files when a user logs off or a job terminates, unless the user explicitly requests that they be kept; other systems keep all files unless the user explicitly deletes them. Discuss the relative merits of each approach. [2 marks]
- c) Given the following reference string for 3 page frames.
2, 3, 4, 5, 6, 3, 6, 7, 3, 7, 3, 8, 1, 8, 9, 2, 4

Sketch the page-replacement operation to calculate the number of page faults generated by using:

- | | | |
|------|-------------------|-----------|
| (i) | LRU algorithm | [3 marks] |
| (ii) | Optimal algorithm | [3 marks] |

End of Paper